

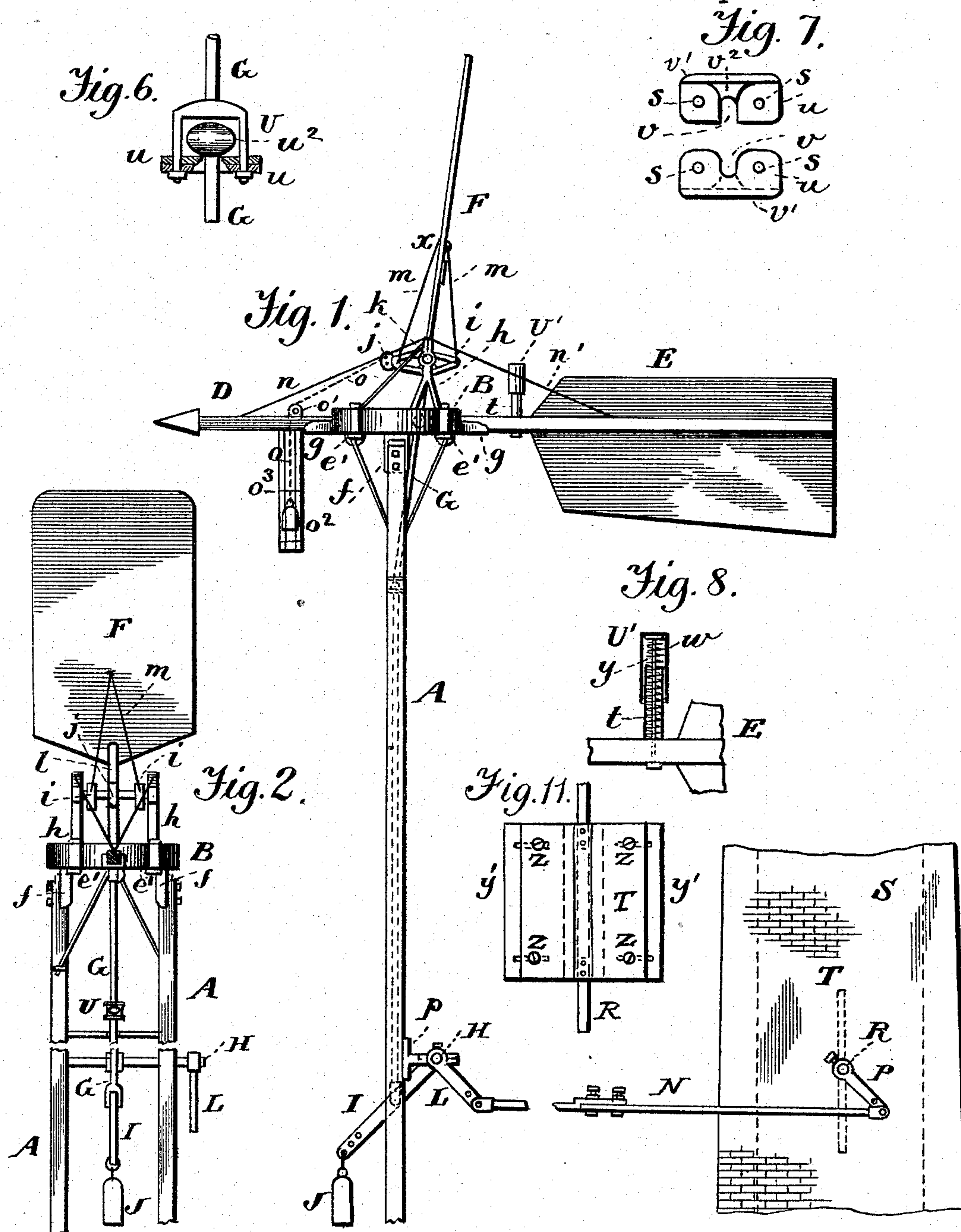
(No Model.)

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C. F. KAUL.  
DRAFT REGULATOR.

No. 526,492.

Patented Sept. 25, 1894.



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H. A. Daniels

Inventor.  
Carl F. Kaul  
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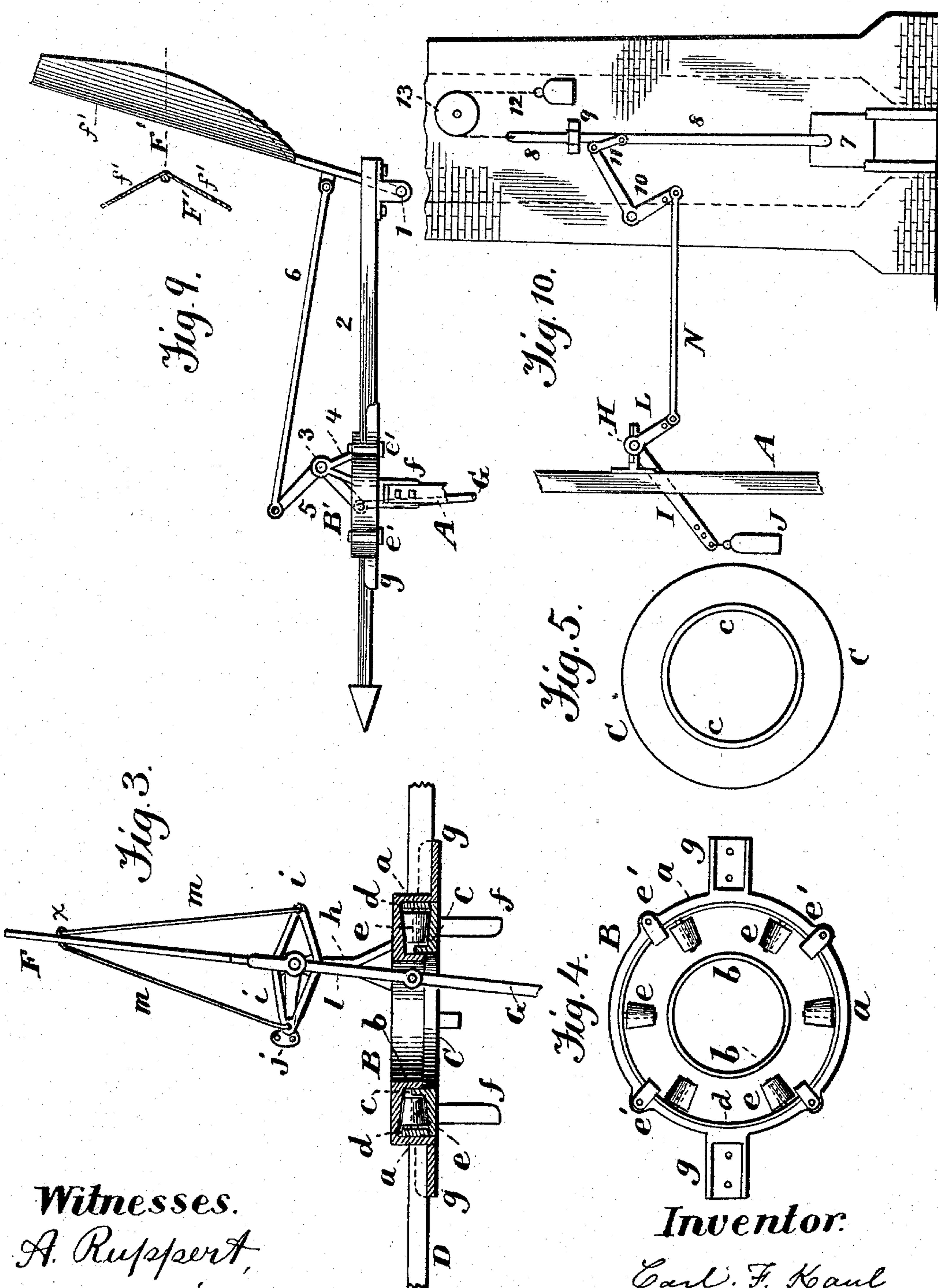
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# UNITED STATES PATENT OFFICE.

CARL F. KAUL, OF MADISON, NEBRASKA.

## DRAFT-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 526,492, dated September 25, 1894.

Application filed March 3, 1894. Serial No. 502,246. (No model.)

*To all whom it may concern:*

Be it known that I, CARL F. KAUL, a citizen of the United States, residing at Madison, in the county of Madison and State of Nebraska, have invented certain new and useful Improvements in Draft-Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to draft-regulating devices for smoke-stacks and ventilating flues, and the object of the invention is to provide a draft regulator which will be automatic in its operation, so that the constant attendance of a workman to set the dampers according to the strength of the draft will not be required.

In the accompanying drawings, Figure 1 represents a side view of a draft regulator constructed according to my invention. Fig. 2 is a partial front view of the same. Fig. 3 is a sectional view of a turn plate and other details. Fig. 4 is a plan view of the turn plate inverted. Fig. 5 is a plan view of a circular, flanged plate which is inclosed by the turn plate. Fig. 6 is a sectional view of a swivel-joint in a connecting rod. Fig. 7 shows in plan two plates used to form a swivel. Fig. 8 is a sectional view of an elastic cushion. Fig. 9 shows a modified form of fan mechanism. Fig. 10 shows a modification of mechanism connected with a damper. Fig. 11 is a plan view of a damper.

A designates two standards of the main supporting frame, on the top of which is mounted a turn-plate B which is circular and is provided with an annular flange *a* extending downward from its edge. The turn-plate is also provided with a central opening which is surrounded by a flange *b* which extends downward from the turn-plate as shown.

C indicates a circular plate which is mounted on the tops of the standards A of the supporting frame and fits loosely in the turn-plate B. The plate C has a central opening and a flange *c*, surrounding said opening, so that an annular chamber is formed, in which is placed a rim *d* which carries the rollers *e* which support the turn plate and on which it may freely rotate, the pins or bolts, forming the axes of the rollers, being firmly

riveted to the rim *d*. The plate C has grooved lugs *f* extending down therefrom and fitting on the standards A to which they may be removably secured by bolts. The rollers *e* are made tapering toward the center of the turn plate as shown. Turn-buttons *e'*, connected with the turn-plate, serve to hold the parts B and C together.

A vane is carried by the turn plate, the indicator or forward part D of the vane and the tail or rearward part E being set in and bolted to grooved arms *g*, which extend from the turn-plate at opposite points. On the turn-plate B are mounted two standards *h* which are provided with boxes in which is journaled a shaft *k*. A fan F is mounted on shaft *k*, the stem *l* of said fan being fast on said shaft and extending down into the central opening in the turn-plate and being connected with a rod G hereinafter referred to.

Fast on the shaft *k*, or made solid therewith, are two frames which form arms *i*, which extend forward and rearward, and brace rods *m* are connected with said arms and with the fan F on opposite sides as seen at *x*. Stay rods, *n*, *n'*, are connected respectively with the forward and rearward parts of the vane and with the standards *h*. An arm *j* extends forward from the stem of the fan F at its pivotal line, and to the end of said arm is attached a chain *o* which is passed over a pulley *o'* and has a weight *o<sup>2</sup>* attached, the connection of said chain with arm *j* being adjustable by perforations in said arm. The weight *o<sup>2</sup>* is intended to balance the fan F and retain it in its upright position. A guide *o<sup>3</sup>* extends down from the vane for the weight *o<sup>2</sup>*.

H indicates a horizontal shaft which is mounted in post-hangers *p* secured to the standards A, and to said shaft is made fast an arm I, to the end of which is adjustably connected a weight J. To the extended end of shaft H is made fast an arm L which extends at a right angle from the plane of arm I.

The connecting rod G connects the stem of the fan F with the weighted arm I, the latter being raised or lowered by the movement of the fan, and the weight J tends to balance the fan in its upright position. The rod G has a swivel joint U which allows the upper section of said rod to turn freely with the



turn-plate and the fan. The swivel U is in the form of a stirrup, the main part of which is rigidly attached to the upper section of the rod G, the prongs of said main part extending down through holes s in two plates u, and secured by nuts. Each plate u is a counterpart of the other, each having a notch v in one edge, said notch extending in beyond the center of the plate, and a flange v' at the opposite edge. A raised portion v<sup>2</sup> on each plate partly fits in the notch v of the other plate, and when the two plates are placed together, each lapping on the other a central aperture is formed for the lower section of the rod G, which is provided with an egg-shaped knob u<sup>2</sup>. In securing the parts of the swivel, the two sections of the rod G are placed in line with the knob u<sup>2</sup> between the prongs. One plate u is placed laterally on the rod G, so that the latter is in the notch v of the plate and the plate is then raised so that the prongs extend into the holes s. The other plate u is then slipped on the rod G, in like manner from the opposite side and raised so that the prongs extend through the holes s when they may be secured by nuts. The central aperture formed in the plates u, when together, is made flaring downward to allow the rod G to swing.

The short arm L extending from shaft H, is connected with one end of a connecting rod N, the other end of rod N being connected with a short arm P made fast to the extended end of a shaft R which may be mounted in the walls of a smoke stack, indicated by S. The shaft R may be made in three parts secured together—see Fig. 11—and a damper T may be secured to said shaft. The damper may be made adjustable in size, the two wings being provided with extension plates y', whereby the damper may be increased or reduced in width by means of screws z which are passed through slots in the extension plates y'.

In operation, the vane keeps the fan F in position to catch the wind, and the fan being pressed backward by the blast, raises the arm I by the connecting rod G, thus turning the shaft H, and, by the crank-arm L, drawing the connecting rod N, which latter is connected with the arm P on the damper shaft R. The damper T is thus turned toward its closed position and the draft in the smoke-stack is thus reduced. When the wind goes down, the movements of the rod G and connections are reversed, the weight J, hung to arm I, bringing the fan F toward its vertical position, and consequently the shaft R of the damper is turned, so that the damper is turned toward its open position. When the wind blows hard, pressing the fan F over rearward, it is liable to strike the tail part of the vane. To prevent this, a cushion U' is mounted on the vane-stem in position for contact with the fan in case of such movement of the latter, said cushion consisting of a tube t, which is fast on the stem, a spiral spring y,

placed on said tube, a tubular cap w, supported by said spring, and a rod extending down from said tubular cap through said tube t and the vane stem. When the fan is pressed over backward too far, it comes in contact with the cushion U', the spring y yielding somewhat to the stroke.

In case a storm comes on suddenly and the wind blows with violence when a kiln having the appliance is in operation, it is important that the draft which is greatly strengthened, should be promptly reduced; otherwise the fuel in that section of the kiln where burning is going on is too rapidly consumed and the brick which are in process of drying become heated too rapidly and the brick already burned cool off too suddenly and are cracked or otherwise damaged. But by the automatic operation of the device described, the draft, when greatly strengthened by a high wind, is immediately checked and such damage is prevented, and the drying and burning operations proceed with a uniform and steady draft.

Some modifications in the construction of the device may be made with the same principle of operation.

In Fig. 9, the wind-catching fan F' is secured to a shaft 1, in bearings carried by two arms 2 extending from the turn-plate. The fan is made concave, or with two wings f' extending laterally at an angle from the center line of the fan, the tail piece of the vane being omitted as the fan answers the purpose of it. A shaft 3 is mounted in bearings 4 carried by the turn plate B', and to said shaft 3 is made fast a bell-crank 5, to the lower arm of which is pivotally attached the connecting rod G, the upper arm of the bell-crank being connected by a rod 6 with the stem of the fan. The fan F' and its connections being thus constructed, the concavity of the fan being forward or in position to catch the wind, will keep the vane in position toward the wind so that the fan will operate the connecting rod G and the mechanism connected therewith as before described.

In Fig. 10, is shown a modification in the construction of the damper in the smoke stack and its connections, the damper being a sliding damper located in a side wall of the smoke-stack at or near the base. A vertical rod 8 is connected with the damper 7, and extends upward through a guide 9, secured to the wall of the stack. A bell-crank 10 is pivotally secured to the stack-wall, and a pitman 11 connects the upper arm of the bell-crank with the rod or stem 8. To the upper end of the rod 8, is attached a cord or chain 12 which is passed over a pulley 13, the bolt or axis of which is secured to the smoke-stack, and a weight 14 is attached to said chain. The lower arm of the bell-crank 10, is connected with the rod N, the opposite end of which is connected with the arm L on the shaft H. As will be seen, when the weighted arm I is in the position shown in Fig. 10, the



damper 7 is held in its open position by the weight J and the connecting mechanism between the arm I and the damper stem 8, but when the arm I is raised by the action of the fan, the damper 7 is moved downward to its closed position. The weight 12 is a governing balance weight and renders easy the raising of the damper, little force being required for such purpose.

10 The apparatus described may be located in any suitable position in relation to the smoke stack or chimney, and may be constructed with several wind-catching fans. It may also be employed in connection with ventilating  
15 devices to operate the same.

I claim—

1. In a draft regulator, the combination, with a frame, of a turn-plate, a vane carried by said turn-plate, a fan pivotally mounted  
20 on said turn-plate, a horizontal shaft in bearings carried by said frame, a weighted arm extending from said shaft, a rod connecting said fan with said weighted arm, and mechanism connecting said shaft with a damper  
25 in a flue, through which mechanism said damper may be operated, substantially as and for the purposes described.

2. The combination with a pivoted fan having a laterally rotative movement, of a rod,  
30 connecting said fan with operating mechanism, said rod being provided with a swivel joint, formed of two flanged, perforated plates, constructed to lap one on another as shown

and having notches in their edges, one section of the rod having prongs and the other  
35 section being provided with a head, substantially as shown and described.

3. In a draft regulator the combination with a vane, of a pivoted fan having a swinging movement forward and rearward, a cushion  
40 in position for contact with said fan, said cushion being formed of a fixed vertical tube, a spring placed therein, a tubular cap resting on said spring and adapted to move on said fixed tube, and a rod, fixed to said cap and  
45 extending downward through said fixed tube, substantially as set forth and described.

4. The combination with a frame, of a flanged turn-plate having a central opening, a circular, flanged plate, having a central  
50 opening, a series of rollers supporting said turn-plate, a vane in two parts, secured to said turn-plate at opposite points, a shaft *k*, mounted in bearings carried by said turn-plate, a fan secured to said shaft, an arm *j*,  
55 connected with said fan, a governing weight *o*<sup>2</sup> connected by a chain with arm *j*, and a rod connecting said fan with operating mechanism, substantially as set forth and described.

In testimony whereof I have affixed my signature in presence of two witnesses.

CARL F. KAUL.

Witnesses:

D. G. STUART,  
A. RUPPERT.